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Passed March 1828

Inaugural Essay

on Dentition and Cholera Infantum.

For

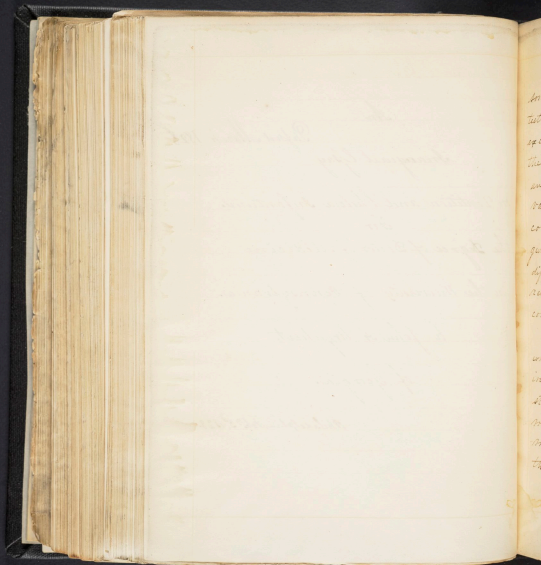
the Degree of Doctor of Medicine

in the University of Pennsylvania.

by John A. Wierheart,

of Georgia.

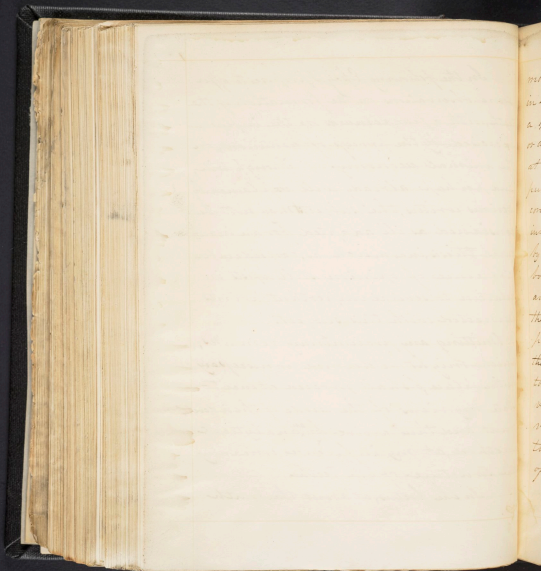
Philadelphia, Feb. 3. 1828.



In the following Essay I propose to offer some observations on the formation of the teeth, with a few remarks on the influence exercised by the process of dentition, on the animal economy. Though trite, and perhaps already well explained by various writers, the subject may not be considered as ill adapted for an inaugural thesis, inasmuch as, considerable differences of opinion still exists in relation to several important points connected with this subject.

Omitting any preliminary remarks, which might be deemed unnecessary in this place, I shall proceed at once to state my views of the mode of their development and thus arrive, by ^{an} analytical method, at my inferences concerning the structure of the teeth.

In the foetus, at about the fourth



month of gestation, there may be discovered
 in either jaw, some small cells, seated in
 a spongy kind of bone denominated alveoli,
 or alveolar processes; these cells are occupied
 at an earlier period, by an elementary
 pulp, known as the pulp of the tooth: it is
 contained in a capsule, which completely
 invests it, and which also lines the alveolar cavity,
 by being reflected upwards from the
 bottom of the socket; it has now the appear-
 ance of two sacks, the internal one covering
 the pulp, and the external answering the
 place of a periosteum to the interior of
 the socket; their points of attachment are
 to the gum above, and to the dental blood
 vessels and nerves below. The pulp, or
 vessels, as it is sometimes termed, furnishes
 the bony matter of the tooth, by means
 of transudation from its external surface.
 According to Mr Hunter the ossification

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of a tooth, commences on that surface of the pulp next to the gum, by one, or more points, according to the number of projections, or cusps, the future tooth is to have on its grinding surface. In its early stage, the opacous deposit is soft, and elastic. The pulp is supported by a very delicate membrane, and when fully developed, is found to possess the precise form of the future tooth; it as before stated, furnishes the opacous matter of the tooth by transudation from its external surface; therefore, the first lamina forms the outlines of the tooth, and in proportion as these laminae grow thicker, which is by the gradual accretion of new deposits from within outwards, the pulp is in the same proportion compressed, and diminished in size, or in the words of Mr Hunter, is converted

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into a fang by its elongation towards
towards the bottom of the socket.

The completion of the roots
of the teeth is a subsequent process of
ossification; their number is always
the same with the number of distinct
nerves and bloodvessels which go to the
pulp of the teeth. The roots, in their finished
state, are pointed, with a small canal
passing through them to the basis of the
teeth, in which are lodged the remains
of each vesicle, being much smaller at
that time, than while in the fetal state.

As I have now stated as nearly
as I could, all that suggested itself respecting
the long matter of the teeth, together with
their mode of development, and the apparatus
by which they are produced, it next becomes
essential, in order to finish the description
of these organs, to give some account of their

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enamel, or external covering.

This curious substance differs from the other portions of the tooth by its superior hardness, as well as by its want of animal matter, which is proposed by all the true bones of the living body; that it is inorganic, appears to be now generally admitted, from the numerous proofs that have been adduced in favour of that opinion: in the first place, it is never known to be replaced when once removed; it has also a supposed resemblance to the cuticle, the inorganic nature of which no one pretends to deny; but to establish the inorganic nature of the enamel more firmly, it seems sufficient to add that such was the opinion of Mr Hunter, an opinion founded on the result of experiments made for the purpose of ascertaining its truth, and which, made by a man of so high

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a reputation ought to have the greatest weight.

I shall have occasion in the next place to advert to the outer one of the two membranes already represented as lining the alveolar cavity, and forming a reflection from the bottom of the socket, the internal Membrane that invests the pulp. This outside membrane secretes the enamel of the tooth, and deposits it in perpendicular striae, of about half a line in thickness, by which arrangement, together with its extreme hardness, it is enabled to withstand the friction to which the teeth are exposed, without injury.

The crown of the tooth, as far as the neck, is the only part that has a covering of enamel, a circumstance, difficult to account for, since, the membrane which furnishes this substance, goes

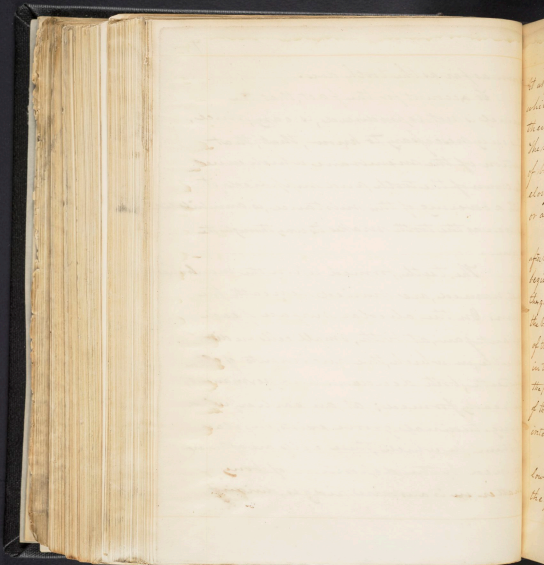
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down as far as the tooth does.

To account for the fact, that the enamel is not reproduced, is easy, since, it is only necessary to know, that, that portion of the membrane which covered the crown of the tooth, and supplied it with a covering of this substance, is annihilated as soon as the tooth makes its way through the gum.

The teeth, formed upon the membrane just named, are buried beneath the gums. On the alveolar surface of each infant jaw, at birth, small cells are discernible, in which, the rudiments of all the teeth, both deciduous and permanent, are ready formed; at an earlier period, a longitudinal groove exists, in place of them, in which, these cells are afterwards formed by the deposition of bony matter in transverse ridges, dividing



At first into superficial depressions, which appear to be influenced in their size, by the growth of the teeth. The roots of the deciduous teeth, at the period of birth, are not completed, but, are somewhat elongated towards the bottom of the sockets or alveoli.

At about the expiration of six months after birth, the tooth is more fully developed, and begins, by a certain process, to make its way through the gum; the roots in elongating themselves, cause the body of the tooth to rise and press on the portion of the gum and membranes immediately above; in this manner, the absorbents are excited to remove the parts just mentioned, and the entire expulsion of the body of the tooth is effected without further interruption.

The teeth which are first cut, are the two lower middle incisors; their appearance through the gum is announced, at first, by pain and

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tumescence in the part, succeeded by their eruption,
which takes place between the fourth and eighth
month after birth. The next which are cut,
are the upper incisors, and the two lower, on the
side of those already cut. The first molar,
on each side, are next in succession, and are
followed by the cuspidate or canine teeth; and,
at the end of the second year, the last molar
appears, which completes what is termed the first
dentition; this furnishes the child with eight incisors,
four canines, and eight molar, making in all,
twenty teeth which is its complement.

The shedding of the deciduous teeth,
commences about the sixth or seventh year, though
in a way evidently not well understood, as appears
from the diversity of opinion which exists as to
the nature of the process; some supposing it to depend
on pressure exerted by the permanent teeth on
the roots of the deciduous ones, and in that way
causing the absorption of their fangs; while others

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contend that it is not produced by mechanical
pressure, but that it is a particular process in the
animal economy.

The deciduous teeth become loose, as
already stated, and are succeeded by the perman-
ent; the order of their shedding is as follows.
The incisors loosen about the sixth or seventh
year, and are succeeded by the permanent
cutting teeth; the first infant molar, loosens from
the seventh, to the ninth year; the cuspidatus
gives way about the tenth year, and the second
molar follows in the twelfth, or a little later.

The permanent incisors are formed, as to
their bodies, at the period of birth, as is also the
permanent grinder, on each side.

I have already noticed, in a cursory
manner, the process by which the eruption of
the teeth is effected, and in attempting to
describe it more fully, I fear I should do little
more than repeat what I have already said;

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I will, therefore, dismiss that part of my subject,
and proceed to the consideration of the influence
exercised on the animal economy, by the process
of dentition.

The physiological process of dentition^{te}
is an important act, as it very frequently gives rise
to a variety of pathological affections, some of which
excite so fatal a sway among us, as to give it a
character of great importance, thereby demand-
ing much interest in the investigation of its
history. Dentition is objected to by many, as a
cause of the various diseases that are imputed
to it. By others of equal weight and respectability.
That it should excite disease, is to me a matter
of no surprise, since the whole tooth is invested
with a delicate, and sensible tip, which, as
soon as the tooth acquires an increase of size
is rendered so tense, that pain and inflammation
ensue, which is extended to the contiguous
parts. That it should stop there, when excruciating



would indeed be a matter of some astonishment; for, it has been satisfactorily demonstrated, that, irritation arising from a merely local disorder, may, through the brain and nervous system, produce very great derangements of the digestive & other organs. I infer, that, in infants, the process of dentition is often the source of very considerable irritation, which, seated in the gums and jaws, readily radiates as above said, to the digestive organs, producing fever, imperfect digestion, and cholera; on the last of which, I will now offer a few remarks.

Cholera Infantum mostly seizes children between their fifth, and twelfth month; they are also more liable to the disease during summer than at any other season of the year, and in cities, or other crowded situations, more than in the country, though it is by no means confined exclusively to

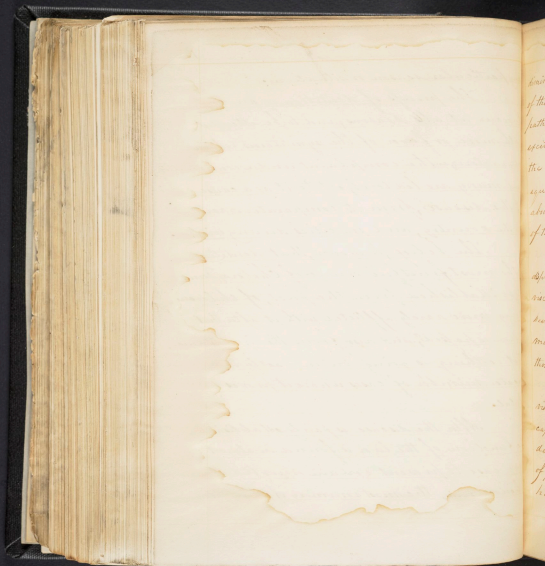
One of the most fruitful sources of

any particular season or situation.

The process of dentition is known to recur at all seasons, and to be attended with more or fewer of the symptoms which characterize the complaint under consideration; and many are led to object to it as a cause of this disease, from its comparative rarity in the country, and in cities during winter.

The belief, however, that dentition is the most fruitful source of Cholera, seems to be established from the fact, of children being more rarely afflicted with it after that period is passed, and also from the circumstance, that teething is going on in vastly the greater number of cases where it proves fatal.

After the disease is fairly established, the function of the liver is found in almost every case to present certain morbid phenomena, the most common of which is



diminished secretion, owing probably to congestion of that viscus, this is accounted for by a general pathological principle, which is, that, increased excitement cannot be long continued in the human body, without destroying the equilibrium of the circulation, which is absolutely necessary to the healthy condition of the human frame.

The liver in a young child, from its disproportion, in point of size, to the other viscera, and the sluggish action of its vessels, seems to be rendered more susceptible of morbid derangements, and particularly, those of a congestive nature, than in an adult.

These determinations to the different viscera produce a disordered state of the general capillary circulation, which induces at once, derangement of the important function of perspiration; the skin becomes dry and husky, and no longer executes with regularity



the offices assigned to it; the consequence is an increased secretion of fluids in the intestinal canal, which becomes disordered from the vicious nature of those matters.

In *Sholua Infantum*, free discharge of bilious matter, either by vomiting or stool, are of rare occurrence; hence, the inference, that, too great a determination of blood to the portal system has taken place, which disqualifies the liver for the performance of its healthy functions.

The brain, in congestive apoplexy, where the intellectual functions are much interrupted or entirely suspended, may be cited as analogous in its nature to this state of the liver. The lungs, in *Encephalitis Notha*, bear very much the same character as in this case there are effusions into the lungs which prevent a decarbonization of the blood.

Sholua is perhaps a term the least expressive of the facts that occur in this disease.



that could be chosen, as there is a remarkable absence of bilious matter in the vomitings, or purging, which forms perhaps the most prominent feature in its character.

That there are sometimes discharges of bilious matter is not to be doubted, and, particularly, in those cases which do not terminate fatally in a very short time; if the stools are not decidedly bilious, spots of a greenish appearance may be discovered on a mucous serous base, denoting a very diminutive biliary secretion. But, in a majority of cases, particularly, a acute ones, there is an entire want of bilious matter. An attempt is made to prove that there is a disorder of this kind in the secretory function of the liver, & conceive entirely unnecessary, as the fact appears to be admitted by everyone.

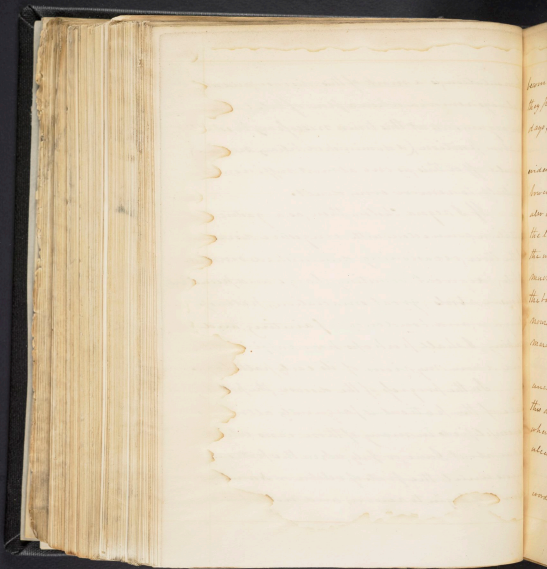
An offensive odour resembling that of putrid animal matter undergoing putrefaction

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fermentation, is a mark of this disease, and which
is always removed when a flow of bile takes place;
were arguments at this time necessary to establish
the above position (a diminished biliary secretion)
I would offer this, as one almost sufficient
in itself to remove every doubt.

If I regard Cholera then, as a gastric
irritation, connected with congestive disease
of the liver, occasioning diminished secretion
of bile; frequent vomiting; large and peculiarly
offensive stools; great emaciation, paleness
langor, and tendency to fainting, and
sinking, I shall, perhaps have sufficiently
laid down my views of its early pathology.

In the progress of the disease, the pathological
state of the patient is frequently altered, as
is exemplified in many of those cases which
occur about June, or July, when the patients
linger until the frost of October or November,
before they begin to recover; and not a few



become victims of the chronic forms; and they perish at all periods, from three or four days, to as many months.

Under this protracted form, it is evident that the mucous membrane of the bowels will suffer more or less; there will also be derangement of the portal circulation; the lacteal and lymphatic absorbents of the whole abdominal cavity, will experience much derangement as to their functions: the body, will, therefore, be imperfectly nourished, and a state of cachexy or marasmus will be the result.

Dysenteric symptoms are not uncommon as is affirmed by writers on this disease, and it appears particularly when connected with it, that there is an ulcerous condition of the colon and rectum.

I shall now proceed to state, in a few words, the treatment to be pursued.

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This part of my Essay must be necessarily imperfect, as I have occupied much of the preceding portion in anatomical details, and have, therefore, but little room to devote to the therapeutical division of this subject, as laid down by the books.

The indications of cure, are, in the first place to be carefully ascertained. In the early stage, where the disease is slight, the stomach and bowels being but little affected, the indication will be to remove the prime source of irritation in the gums by lancing them freely; the other causes may be removed by completely evacuating the alimentary canal of its irritating contents, and thus, by removing the causes of irritation, an opportunity is afforded the liver either to unload itself by restoring its lost powers of secretion, or a more healthy portal circulation, for it is not likely, that,

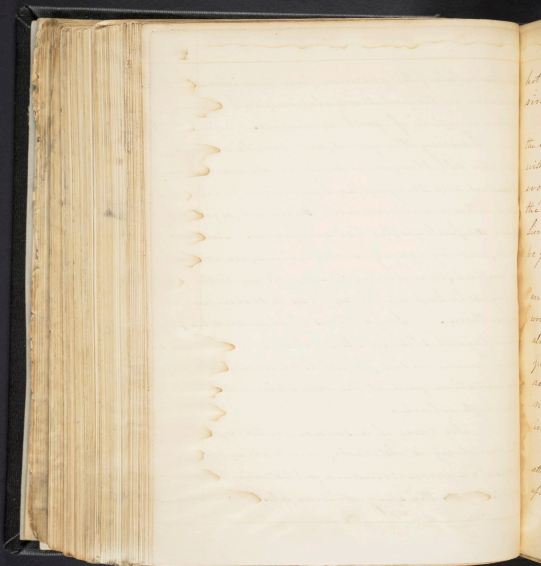
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the other vessels of the abdomen than these immediately concerned in the portal circulation, can be ~~regulated~~ by the operation of gentle evacuates.

Lancing the gums, and gentle evacuates, as Castor oil, Oleaginous mixture, Spiced Rhabarb, Rhabarb and Magnesia, balneol, in small doses, either combined with Rhabarb, or followed by oil, are, perhaps, the best evacuates. Neutral salts, and hydragogue Medicines, are considered as heatful, by irritating the bowels in such a way as to keep up too copious a secretion from them. Injections of flax seed tea, mucilage of slippery Elm, Starch, and sweet Oil, are of much value, as they loosen very much, the irritation and at the same time keep the bowels soluble.

In cases of a severe nature, where the vomiting is obstinate, much may be expected from mustard or blistering plasters, applied to the epigastrium, along the sides,

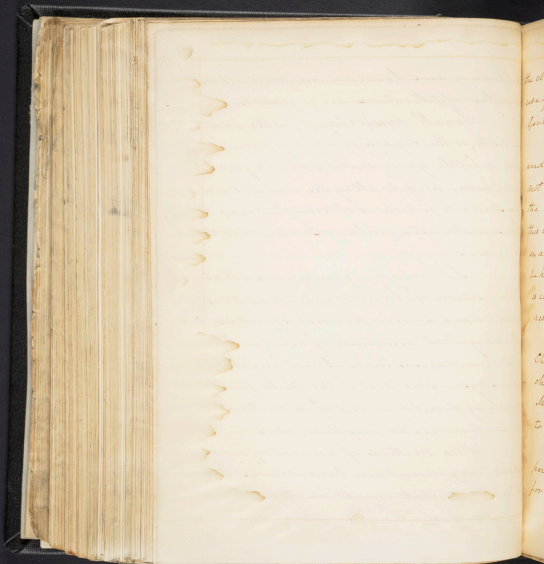


hot brandy and laudanum, and other similar applications, are of great importance.

Small doses of calomel, as the fourth, the sixth, or the eighth of a grain, combined with a little gum arabic may be given every hour; and to allay the irritability of the stomach, which is of much importance, Lime water and Milk, or Soda water, may be given.

I should have mentioned that an injection of laudanum and starch, would have a more decided effect in allaying that condition of the stomach just mentioned, than almost any other remedy. The diet of the child, if a nursing should consist of its mother's milk in preference to any thing else.

The methods of combating a severe attack have now been laid down. If after treatment consists in attention to



the clothing and diet of the patient, and the use of some mild tonic, as the Extract of Gentian, or Sulp. of Quinine in Symp. &c.

Country air is of the greatest importance; and when practicable the patient should not be denied the purest, and in some cases, the almost only resource for recovery; when this cannot be obtained, as a substitute, exercise in a carriage in fine weather; or sailing may be had recourse to; something of the kind is considered of vital importance for the restoration of health and strength.

I shall here close my account of Cholera, because, when the disease becomes chronic, it partakes more of the nature of Marasmus, for an account of which, I refer to the excellent work of Dr. Syre.

Hoping that the want of any considerable personal experience, may serve as my excuse for the absence of minute details; and that



the omission of probably some important indications as to the character or treatment, of the disease, I beg leave to offer the above sketch, rude and imperfect as it may be, to the consideration of my respected teachers.

J. A. Vaughan

